

CLIMATE CHANGE, SAFETY, HEALTH AND ENVIRONMENT

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ON
WORLD ENVIRONMENTAL DAY
WITH
THE THEME: “SMALL ISLAND DEVELOPING STATES;RAISE
YOUR VOICE,NOT THE SEA LEVEL”
AT

KADUNA REIFINERY AND PEROL CHEMICAL COMPANY
ORGANIZE
BY

CORPORATE TECHNICAL COMMITTEE ON HEALTH
SAFETY & ENVIRONMENT (CTC ON HSE)
ZONAL OFFICE GOBARAU ROAD KADUNA

INTRODUCTION

The effects of climate change (CC) are often discussed in terms of its impacts on the environment and the general population. To date, the scientific community has focused very little on its repercussions on occupational health and safety (OHS), yet workers can be affected both directly and indirectly by CC, notably by the heat stress to which they may be exposed and by changes in the ecosystems that form the basis of their economic activities. The general objective of this study is to explore this barren but important area on this important day, “World Environmental Day” . The presentation will focus on issues relating to the negative impact of climate change on occupational health and safety practices in our various work places. More specifically, the goals were to:

- (1) provide an overview of the links between CC and its potentially adverse effects on OHS in our various working places
- (2) plan and implement a working and consultation procedure for the promoting of industrial, national and international dialogue and reflection on the issue of Climate change,
- and (3) at the same time identify the priority issues that are pertinent to
- industries in terms of knowledge needs on how cope with CC situation.

CLIMATE CHANGE

- it is no more news for us to understand that there is serious change in the level of heat, decrease in water supply, decrease in the amount of rainfall, flooding and drought at the same time in our various world environment. Do we really care to ask what are the reasons for all these happenings?
- We heard of EL-NINO,
- LA-NINA as a result of weather shift to 180 degrees,
- TSUNAMI, & HURRICANE
- in 1997 and 1998 the states of California and Oregon suffered serious storm, which destroy the coastline, causing coastal erosion and severe flooding,
- East Africa experienced higher rainfall five times more than normal, in contrasts to their serious drought & Famine experiences,

CLIMATE CHANGE

- Hurricane in Mexico,
- over 1,400 square miles of drought affected areas were on fire in Indonesia, creating serious cloud of smoke,
- in New Guinea lack of rainfall brought crop failures leading to food relief.
- The state of Florida experience hot, dry weather that triggers wildfires that swept through woods and suburbs, fueled by lush vegetation nurtured by El-Nino.
- Heavy rainfall in Venezuela, China, and Mozambique experienced disastrous flooding.
- Tropical Atlantic spawned an usual hurricane,
- all condition in most of these countries became normal by 2000.
- All these left the world with **over 22,000 deaths with an estimated damage of over \$36billion.**
- The 1997-2000, El-Nino and La-Nino left the world with a memorable global climate we will hardly forget.
- This also serve as a lesson to the globe with the teaming up of the atmosphere and oceans ,
- This shows that we are at the mercy of a system we neither control nor understand.

CLIMATE CHANGE CONTINUE

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CLIMATE CHANGE, EMISSION FROM DIFFERENT SOURCES AND HEALTHY ENVIRONMENT

- Systematic records of the factors making up weather, temperature, precipitation, storms etc was stable for only about a hundred years.
- How ever these records inform us that our climate is hardly constant
- Records from weather stations and metrological observations around the world tells interesting stories
- Since 1855 global average temperature recorded periods of cooling and warming with an increase of about 0.6degrees
- On record two warming period occurred in the 20th century one from 1910 to 1945 and the latest's from 1976 to the present moment
- The above is in addition to proxies that shows historical account of the Northern Hemisphere enjoying warming from 1100-1300A.D.
- This was followed by 'Little Ice Age' between 1400-1850 A.D.
- This is in addition to tree rings, pollen deposits, changes in landscape, marine sediments, corals and ice cores.
- An assessments of ICE CORES in Greenland and the Antarctica revealed that, from it thickness the gas content, specifically carbon dioxide (CO₂) and Methane (CH₄) two measure greenhouse gases and isotopes alternative energy source from nuclear, this is in addition to isotopes of oxygen and hydrogen, behave differently when condensed and incorporated into ice.

CONTRIBUTING CHEMICALS

• CARBON DIOXIDE

- CO₂ increases the seasonal changes of photosynthesis and respiration in terrestrial ecosystems in the Northern Hemisphere
- CO₂ levels rise when photosynthesis predominates
- Salient evidence shows that CO₂ levels is rising at the range of 0.8 to 1.9 ppm per year in recent years
- As at early 2004 atmospheric CO₂ levels were over 375 ppm,
- This is 35% higher than they were before the industrial revolution
- And higher than it were over 400,000 years ago
- This was & is attributed to the use of fossil or petrol fuel
- Every kilogram of fossil fuel burned produces about 3 kg of CO₂
- Currently 6.6 billion metric tons of fossil fuel carbon are burn each year this is added to the atmospheric CO₂
- This was promoted by the industrialized countries

• FORESTS BURNING

- This is another anthropogenic source that add some 1.6 gigatons annually to the carbon already coming from industrial processes
- All these minus carbon sinks, since an estimated carbon generation stood at 8 gigaton per year and not 3.2 that accumulated in the atmosphere per year. This shows the rest are absorbed by carbon sinks

CONTRIBUTING CHEMICALS: OTHER GREEN HOUSE GASES

- **Water Vapour**; this chemical contributed in trapping energy radiated back to the atmosphere, the high concentration of water vapour significantly contribute to the heating of the ocean surface and the lower atmosphere in the tropical pacific
- **Nitrous Oxide(N_2O)**: the emission of this chemical have increase with about 15% during the last 200 years and are still rising. This is as a result of agriculture eg fertilizer and burning of the biomass with fossil fuel contributing a smaller percentage.
- **Ozone**: this is as a result of the chemical dropping down from the troposphere as a result action of the sunlight and pollutants
- **CFC'S and other Halocarbons**: this is as a result of human actions or what we call anthropogenic activities, usage of nitrous oxide, halocarbons use as refrigerants, solvent, and fire retardants it has 10,000 times capacity of absorbing radiated infrared than CO_2 , so also chlorofluorocarbons. It use was halted after the Montreal accord of 1987 and record had shown that it has started declining since 1990's
- **Sulfur** ;too is a contributor, I believe it will be discuss by the other presenters

ANIMAL DUNGS, WATER & METHANE PRODUCTION

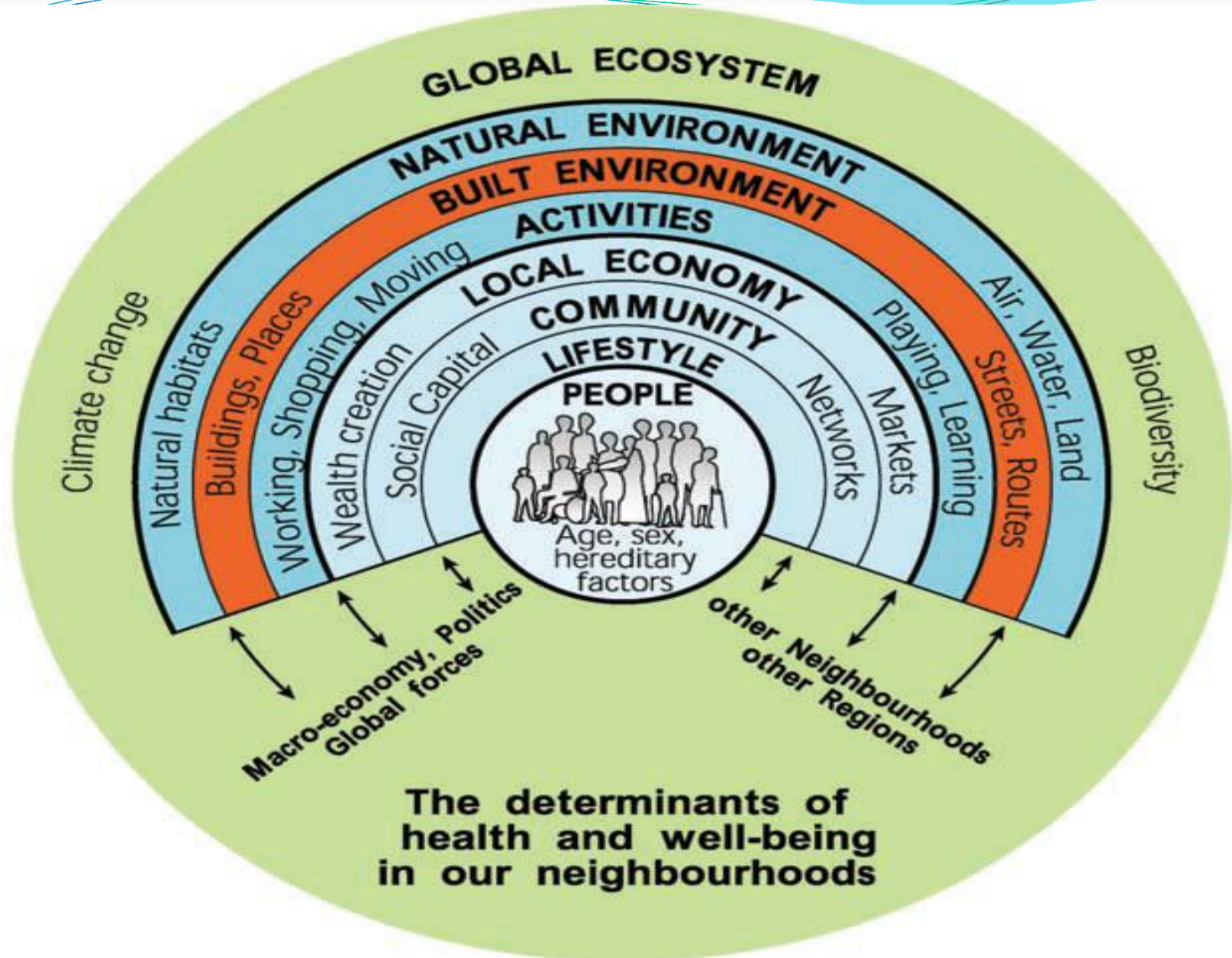
- **Methane (CH_4)**; this is as a result of microbial fermentative reactions; its main sources is wetlands. This includes livestock's such as ruminants like:
 - Cows also emit considerable amounts of methane, which is a more potent greenhouse gas than carbon dioxide.
 - It has been estimated that the annual amount of methane emitted by a herd of 200 cows is the same as the carbon dioxide emissions of a car burning 21,400 litres of petrol,
 - Or being driven for over 100,000 miles.



CARBON EMISSION & LOCAL TRANSPORT

- A carbon footprint assessment of the NHS in England found that 60% of total carbon emissions were attributable to procurement of goods and services,
- while NHS England was responsible for 30% of carbon emissions across the public sector.
- This highlights that *procurement can significantly contribute to tackling climate change in a number of ways.*
- *Utilizing local products where possible can be particularly effective, not least because this reduces transport costs as well as emissions.*
- *Favoring local producers can also increase the viability of local business, including local food production*

GLOBAL ECOSYSTEM DIAGRAM





Asthma, Respiratory Allergies, and Airway Diseases—

➤ **Respiratory allergies and diseases may become more prevalent because of increased human exposure to pollen (due to altered growing seasons),**

➤ **molds (from extreme or more frequent precipitation), air pollution and aerosolized marine toxins (due to increased temperature, coastal runoff, and humidity) and dust (from droughts).**

➤ MITIGATION MEASURES

➤ **Mitigation and adaptation may significantly reduce these risks.**

➤ **Research should address the relationship between climate change and the composition of air pollutant mixtures (e.g.,)**

➤ **how altered pollen counts and other effects of climate change affect the severity of asthma**

➤ **to produce models to identify populations at risk.**

➤ **Such tools should support the use of science in understanding disease risks and as such, are an integral component of developing effective risk communication**

➤ **and targeting the messages to vulnerable populations.**

WE CAN REDUCE ENVIRONMENTAL HEATING BY USING BIKES
INSTEAD OF CARS



Warmer temperatures demand good infrastructure

- An average change in climate as we are witnessing now could be exacerbated by further emissions from bigger industries like the oil and gas industries.
- The more safety conscious the workers are the better for our health and that of the general environment.
- All emissions must therefore be within the accepted threshold level to avoid heating the environment more
- With higher average temperatures, the resilience of buildings in particular becomes increasingly important.
- Many current buildings may not be designed for warm summers and can therefore become *uncomfortably or unsafely warm indoors especially industrial buildings*.
- *In urban areas, the **urban heat island effect** may increase as the greater total surface area traps more heat,*
- *further heating up the environment.*
- *This increases the demand for mechanical cooling, which increases maintenance costs.*
- *The increased electricity demand also contributes to further climate change, as well as potential electricity price pressures.*

WARMER TEMP & OZONE

- Warmer and sunnier summers can also lead to poorer air quality.
- This is primarily because concentrations of ozone increase on hot, sunny days.
- This happens because ozone is produced when other pollutants (volatile organic compounds like sulfur oxide and nitrogen oxides), so called ozone precursors, react with sunlight.
- A review of the likely health effects of climate change in England estimated that rising ozone concentrations will lead to a *15% increase in attributable deaths*
- *and hospital admissions due to respiratory disease.*
- *Ozone concentrations are predicted to rise due to climate change itself,*
- *although concentrations are also affected by changes in emissions of precursors.*

CLIMATE CHANGE, DEFORESTATION AND DRIED CONDITION



Changing to an Alternative Energy Source like wind Powered source: Could Reduce Emission Global Warming



Climate Change and Cancer

- Many potential direct effects of climate change is associate with cancer risk,
- such as increased duration and intensity of ultraviolet (UV) radiation, are well understood;
- however the potential impact of changes in climate on exposure pathways for chemicals and toxins requires further study.
- **MITIGATION MEASURES**
- Science should investigate the effects of mitigation and adaptation measures on cancer incidence so that the best strategies can be developed and implemented;
- for example, research to inform an understanding of the benefits of alternative fuels,
- new battery and voltaic cells,
- and other technologies, as well as any potential adverse risks from exposure to their components and wastes.
- Better understanding of climate change impacts on the capacity of ocean and coastal systems to provide cancer curative agents
- and other health-enhancing products are also needed.

INDUSTRIAL HEAT EMISSIONS AND CLIMATE CHANGE



Cardiovascular Disease and Stroke

- **Climate change may exacerbate existing cardiovascular disease**
- **by increasing heat stress,**
- **increasing the body burden of airborne particulates,**
- **and changing the distribution of zoonotic vectors that cause infectious diseases linked with cardiovascular disease.**

➤ **MITIGATION MEASURES**

- **Science that addresses the cardiovascular effects of:**
- **higher temperatures,**
- **heat waves,**
- **extreme weather,**
- **and changes in air quality on health is needed,**
- **and this new information should be applied to development of health risk assessment models,**
- **early warning systems,**
- **health communication strategies targeting vulnerable populations,**
- **land use decisions, and strategies to meet air quality goals related to climate change.**
- **In some areas, cardiovascular and stroke risks resulting from climate change could be offset by reductions in air pollution due to climate change mitigation.**

Foodborne Diseases and Nutrition

- **Climate change may be associated with:**
- **staple food shortages,**
- **malnutrition,**
- **and food contamination such as:**
- **seafood from chemical contaminants,**
- **biotoxins, and pathogenic microbes, (release to river chemical effluent/use water from industries)**
- **and of crops by pesticides.**
- **MITIGATION MEASURES**
- **Science research needs in this area includes:**
- **better understanding of how changes in agriculture and fisheries Occur as a result of Climate Change (eg Chad Basin)**
- **This may affect food availability and nutrition,**
- **better monitoring for disease-causing agents,**
- **and identification and mapping of complex food webs and sentinel species that may be vulnerable to climate change.**
- **This research could be used to prepare the public health and health care sectors for new illnesses, changing surveillance needs, and increased incidence of disease,**
- **as well as development of more effective outreach to affected communities.**

Heat-Related Morbidity and Mortality—

- **Heat-related illness and deaths are likely to increase in response to climate change**
- **but aggressive public health interventions such as:**
 - **heat wave response plans**
 - **and health alert warning systems can minimize morbidity and mortality.**
- **Additional science should be focused on developing and expanding these tools in different geographic regions,**
 - **specifically by defining environmental risk factors,**
 - **identifying vulnerable populations,**
 - **and developing effective risk communication**
 - **and prevention strategies.**

EMISSIONS, HEAT AND CLIMATE CHANGE



Human Developmental Effects

- **Two potential consequences of climate change would affect normal human development:**
 - **malnutrition—particularly during the prenatal period and early childhood as a result of decreased food supplies,**
 - **and exposure to toxic contaminants and biotoxins,**
 - **resulting from extreme weather events,**
 - **increased pesticide use for food production,**
 - **and increases in harmful algal blooms in recreational areas.**
- **Research should examine the relationship between human development**
 - **and adaptations to climate change,**
 - **such as agriculture and fisheries changes that may affect food availability,**
 - **increased pesticide use to control for expanding disease vector ranges,**
 - **and prevention of leaching from toxic waste sites into floodwaters during extreme weather events, so that developmental consequences can be prevented.**

OCEAN/RIVERS DRIFT DUE TO CHANGE IN CLIMATE



Mental Health and Stress-Related Disorders

- **By causing or contributing to extreme weather events,**
- **climate change may result in geographic displacement of populations,**
- **damage to property,**
- **loss of loved ones,**
- **and chronic stress,**
- **all of which can negatively affect mental health.**

➤ **MITIGATION MEASURES**

- **Research needs include:**
- **identifying key mental health effects**
- **and vulnerable populations,**
- **and developing migration monitoring networks to help ensure the availability of appropriate health care support.**

Neurological Diseases and Disorders

➤ Climate change, as well as attempts to mitigate and adapt to it, may increase the number of neurological diseases and disorders in humans.

➤ MITIGATION MEASURES

➤ Research in this area should focus on identifying vulnerable populations and understanding the mechanisms and effects of human exposure to neurological hazards

➤ such as biotoxins (from harmful algal blooms),

➤ metals (found in new battery technologies and compact fluorescent lights),

➤ and pesticides (used in response to changes in agriculture),

➤ as well as the potentially exacerbating effects of malnutrition and stress.

Neurological Diseases and Disorders

- Harmful algal blooms (HABs) are increasing worldwide and global climate change is thought to play a significant role.
- Many HAB-related biotoxins cause significant neurotoxic effects in both animals and humans including permanent neurological impairment.
- The algae *Pseudonitzschia* spp. produce domoic acid, a potent neurotoxin that causes amnesiac shellfish poisoning in people.
- Blooms of this algae have been increasing in the coastal areas resulting in significant illness and death in marine animals.
- A decade of monitoring of health of sea species such as sentinel species for human health effects, indicates changes in the neurologic symptomatology and epidemiology of domoic acid toxicosis.
- Three separate clinical syndromes are now present in exposed animals:

NEUROLOGY AND ACUTE DISEASES

(1) Acute domoic acid toxicosis with seizure, permanent hippocampal atrophy, and death;

(2) a second novel neurological syndrome characterized by epilepsy associated with the chronic consequences of sub-lethal exposure to domoic acid;

(3) and a third syndrome associated within utero exposures resulting in premature parturition, neonatal death, and significant neurotoxicity in the developing fetus resulting in seizure activity as the animal grows, as well as long-lasting impacts on memory and learning.

➤ These observations indicate significant potential implications for human health effects, although their exact nature is not known and needs further study.

1 Goldstein, T, et al., Proceedings of the royal society B-Biological

Vectorborne and Zoonotic Diseases

- Disease risk may increase as a result of climate change:
 - due to related expansions in vector ranges,
 - shortening of pathogen incubation periods,
 - and disruption and relocation of large human populations.
- **MITIGATION MEASURES**
 - Research should enhance the existing pathogen/vector control infrastructure
 - including vector and host identification;
 - integrate human with terrestrial and aquatic animal health surveillance systems;
 - incorporate ecological studies to provide better predictive models;
 - and improve risk communication and prevention strategies

Waterborne Diseases

- Increases in water temperature,
- precipitation frequency and severity,
- evaporation-transpiration rates,
- and changes in coastal ecosystem could affects health
- and this could increase the incidence of water contamination with harmful pathogens and chemicals,
- resulting in increased human exposure.
- **MITIGATION MEASURES**
- Research should focus on understanding where changes in water flow will occur,
- how water will interact with sewage in surface and underground water supplies
- as well as drinking water distribution systems,
- what food sources may become contaminated,
- and how to better predict and prevent human exposure to waterborne and ocean-related pathogens and biotoxins.



Weather-Related Morbidity and Mortality

- **Increases in the incidence and intensity of extreme weather events such as:**
 - **hurricanes,**
 - **floods,**
 - **droughts,**
 - **and wildfires may adversely affect people's health immediately during the event or later following the event.**

➤ MITIGATION MEASURES

- **Research aimed at improving the capabilities of healthcare and emergency services to address disaster planning and management is needed**
 - **This is to ensure that risks are understood**
 - **and that optimal strategies are identified,**
 - **communicated, and implemented.**

DRIED OCEAN DUE TO CLIMATE CHANGE



ICE CAP MELTING DUE TO CLIMATE CHANGE: INCREASING THE OCEAN WATER VOLUME



SMOKE UP TO THE SKY INCREASING TEMPERATURE AND POSSIBLE EFFECTS TO OZONE LAYER



MITIGATE AND ADAPT. WITHIN THE HEALTH SYSTEM

- GHG emissions from health systems are immense.
- It was responsible for an estimated over 25 million tonnes of CO₂ emissions.
- Through innovative policy and a focus on sustainable procurement, transport, infrastructure and commissioning, health systems can reduce their GHG emissions and set a powerful example for the rest of society.
- Importantly, many of these interventions have the potential to lead to an improved public health and reduced healthcare costs.
- Health systems can also take steps to become climate resilient and increase the adaptive capacity of the populations they serve.
- Early-warning surveillance systems, infrastructure which can function under the health workforce which can manage the changing patterns of disease brought on by climate change are just some of the approaches being implemented.



PLEASE “RAISE YOUR VOICE &
NOT THE SEA LEVEL”

AND LET US ENSURE THAT
“SMALL ISLAND DEVELOPED
STATES”

THANK YOU AND MAY ALLAH
BLESS YOU ALL